

Dissecting Aneurysm of the Anterior Cerebral Artery with Spontaneous Subarachnoid Hemorrhage

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A 58-year-old woman was admitted to our department due to headache. Brain computed tomography (CT) indicated subarachnoid hemorrhage (SAH), and emergency angiography showed dissecting aneurysm involving the left A1 segment. We performed trapping of dissecting A1 aneurysm and the postoperative course was uneventful. We present a case of dissecting aneurysm in the anterior cerebral artery with spontaneous SAH which was treated by early surgery and resulted in clinically good prognosis.

KEY WORDS : Dissecting aneurysm · Anterior cerebral artery · Subarachnoid hemorrhage.

Introduction

Intracranial dissecting aneurysm is a rare clinical entity although the number of cases have been reported increasingly in recent years. It is usually located in the vertebrobasilar system¹²⁾. Dissecting aneurysm in the anterior circulation in the internal carotid artery and middle cerebral artery has been reported, but involvement of the anterior cerebral artery (ACA) is extremely rare. About two-thirds of the cases of dissecting aneurysms in the anterior circulation manifest as ischemia at the onset, and most patients have been treated conservatively¹⁷⁾. However, it is known that dissecting aneurysm of the ACA with spontaneous subarachnoid hemorrhage (SAH) is associated with high re-bleeding rate and requires urgent surgery¹⁴⁾. We report a case of dissecting aneurysm of A1 segment of the left anterior cerebral artery with spontaneous SAH with literature review.

Case Report

A 58-year-old, previous healthy woman was admitted to the department of neurosurgery, on November 1, 2004. Three days before the admission, she suddenly developed a severe headache, nausea and vomiting after coughing, and the symptoms persisted. At the time she was admitted, she was alert and cooperative but the response to verbal commands was

slow. Other neurological examinations were normal. There was no evidence of trauma. Her blood pressure was 130/90mmHg, and laboratory data were normal. Brain CT revealed diffuse SAH, especially in left sylvian fissure, which was classified as Fisher's Grade 2 (Fig. 1). Carotid digital subtraction angiography revealed dilatation distal to the narrowed lumen at the origin of the left A1 portion, so called "string and pearl sign" (Fig. 2). The tentative diagnosis was SAH caused by ruptured dissecting aneurysm of the left A1 in the ACA.

Immediately after the angiography, operation, with left pterional approach, was performed. The left gyrus rectus was partially removed to expose the left A1 portion of the ACA. The whole wall of the left A1 showed blood blister appearance (purplish red colour) that suggested the subadventitial hematoma. Two small perforators were coming out from the dissected segment, but

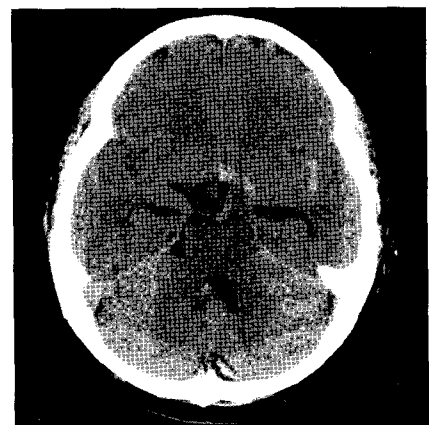


Fig. 1. A brain computed tomography on admission demonstrating subarachnoid hemorrhage dominant in left sylvian fissure.

• Received : August 1, 2006 • Accepted : December 11, 2006

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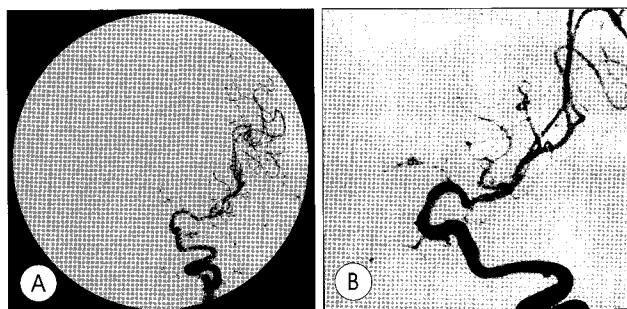


Fig. 2. A, B : Anterior-posterior and left oblique views of a left internal carotid angiography revealing dilatation distal to the narrowed lumen at the origin of the left A1 portion, so called "string and pearl sign"

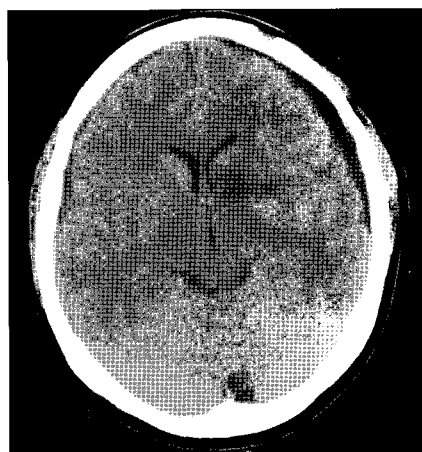


Fig. 3. A brain computed tomography after surgical trapping of the left A1 segment showing an infarction of the left head of caudate nucleus and subdural fluid collection in left fronto-temporo-parietal convexity.

they grossly appeared as in thrombosed state, and the blood flow was not detected by doppler monitoring. The dissecting aneurysm was trapped with two straight clips and Heubner's artery was preserved.

A postoperative brain CT scan revealed an infarction of the left head of caudate nucleus

(Fig. 3), but there was no definitive neurological deficit. Postoperative angiography showed good blood flow to the left ACA through anterior communicating artery (Fig. 4). She was discharged with good recovery.

Discussion

There have been reports of the 49 cases of dissecting aneurysm of the ACA, but among these only 11 cases of

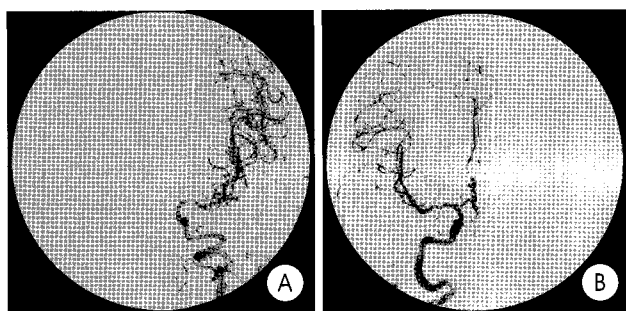


Fig. 4. Repeated angiography (A, B) showing good blood flow to left middle cerebral artery and left distal anterior cerebral artery through anterior communicating artery.

dissection at the A1 segment were evident (Table 1)^{1-3,5,8-10,12,13,15}. In Korea, two cases of dissecting aneurysm at the A2 segment manifesting as infarction have been reported¹¹. SAH secondary to dissection in the ACA is a rare episode and, only 13 cases have been reported. To our knowledge, this is the first report of dissecting aneurysm of the ACA with spontaneous SAH in Korea.

Recently, an increasing number of cases of dissecting aneurysm are being reported, particularly those in the posterior circulation. Initial symptoms of dissecting aneurysms in posterior circulation are mostly those of SAH and, in a few patients, those of cerebral infarction. In contrast, dissecting aneurysms in the anterior circulation usually cause cerebral ischemic attack. The patients most often complain of sudden headaches with or without associated neurological deficits, and onset with SAH is rare⁷.

Most dissecting aneurysms confined to the ACA were male and they were in their 40s. However, hemorrhage rate of the dissecting aneurysms of the ACA did not show gender difference. The etiology of intracranial dissecting aneurysm includes trauma, syphilis, arteriosclerosis, fibromuscular dysplasia, moyamoya disease, migraine and vascular wall abnormality caused by systemic hypertension^{3,12}. Examination by Mizutani et al.¹¹ of biopsy specimens of cerebral dissecting aneurysm obtained from both autopsy and following surgical trapping,

Table 1. Clinical features of dissecting aneurysms of anterior cerebral artery in the literature

Manifestation	Infarction (n=36)	Hemorrhage(SAH, ICH) (n=13)
Mean age(years)	43.6	46.8
Sex		
Male : female	29 : 7	7 : 6
Site		
A1	5 (14)	6 (46)
A1A2	0	1 (8)
A2	23 (64)	2 (15)
A2A3	7 (19)	0
A3	1 (3)	3 (23)
A4	0	1 (8)
Treatment		
Conservative	27 (75)	4 (30)
Surgery	9 (25)	9 (70)
Trapping	6 (16)	6 (46)
Wrapping	2 (6)	2 (15)
Coil	0	1 (8)
Ligation & bypass	1 (3)	0
Outcome		
Good	30 (83)	8 (62)
Moderate disabled	3 (9)	3 (23)
Expire	3 (9)	2 (15)

Values are given as n(%). SAH : subarachnoid hemorrhage, ICH : intracerebral hematoma.

revealed disruption of the internal elastic lamina (IEL) of the artery. Thus, it is proposed that this disruption is the primary mechanism by which such aneurysm forms. Once the IEL is breached, blood entered the media forming a pseudo-lumen that may cause stenosis of the true lumen¹⁶.

Dissecting aneurysms of the ACA manifesting as infarction causes unique symptoms of headache and hemiparesis, that is more severe in the lower extremity in 65% of patients. Headache is a common symptom of intracranial dissections, and believed to result from tearing of the blood vessel. Patients with ruptured dissecting aneurysm of the ACA, mostly manifesting as SAH, showed similar symptoms (headache and vomiting) as patients with ruptured saccular aneurysm^{1,12}.

Dissecting aneurysms in the ACA manifesting as infarction are mostly located in the A2 portion, whereas ruptured dissecting aneurysm are more widely distributed at any site of the ACA. Angiographic findings such as double lumens (false and true lumen), pearl and string sign, string sign (tapered narrowing), retention of contrast material (pooling), wavy ribbon like (ripple) sign and rosset sign are characteristics of dissecting aneurysm^{4,12}. Thorough hemodynamic study, such as compression study, is mandatory prior to surgery as treatment of arterial dissection. It will often involve a sacrifice of an arterial segment and its accompanying perforating branches and may require planning of a bypass procedure to minimize neurological complication⁹.

Treatment of dissecting aneurysm of the ACA remains controversial. The outcome was good for the patients with infarction who were mostly treated by conservative therapy with or without anti-coagulant therapy. The observation of spontaneous healing in some dissecting aneurysms with infarction within a few months supports the conservative therapy. Mori et al.¹² indicated that dissecting aneurysm of the ACA manifesting as infarction should be treated conservatively, but surgical intervention with or without bypass procedure should be considered if progression of the dissection with clinical deterioration occurs¹¹.

The outcome was relatively poor for the patients with ACA dissection and SAH. Leach et al.⁹ recommended that treatment of SAH from dissecting ACA aneurysms should be directed towards the prevention of rebleeding. The rebleeding rate was 44% before admission and largely accounted for 66% poor outcome in the group with intracranial carotid circulation dissection and SAH⁴. Delayed bleeding also has been reported following ischemic presentation of such aneurysm⁶. Therefore, in cases of ACA dissection with SAH, surgical treatment such as wrapping, proximal occlusion and trapping with or without bypass procedure is considered necessary. The successful results of vertebral or internal carotid artery dissecting aneurysm treated with stents or coils indicated that endovascular treat-

ment is another optionating modality to treat dissecting aneurysm of the ACA. However, for ACA dissecting aneurysms, there are potential risks due to the narrowed lumen with difficulty in catheter advancement.

In the literature, six of 13 patients who underwent trapping obtained good outcome. One of the 2 patients who underwent wrapping also achieved good outcome while the other suffered from moderate disability. Another patient who underwent coil showed moderate disability. One of the 4 patients who received conservative therapy produced good outcome while another had moderate disability and the other two died.

In our case, we selected trapping surgery because angiography indicated good collateral flow through the anterior communicating artery and the findings at the operation showed perforating arteries without flow, that convinced us that there wouldn't be a problem with trapping. We also considered A2-A3 bypass surgery, but didn't try due to risk of bleeding. Postoperatively, unexpected infarction of the left head of caudate nucleus was developed, but there was no definitive neurological deficit.

Conclusion

We experienced a case of dissecting aneurysm of the ACA with spontaneous SAH that was treated by early surgery and resulted in clinically good prognosis. We suggest conservative therapy for patients of dissecting aneurysm of the ACA presenting with infarction and early trapping surgery for patients with SAH.

Acknowledgement

This work was supported by the research grant of the Chungbuk National University in 2006.

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